September 24, 1953

Dr. Allan Campbell
Department of Bacteriology
University of Michigan
Ann Arbor, Mich.

Dear Allan:

Under separate cover, as requested in your letter of the 22d, I am sending the K-12 derivatives, W-6 and W-1177 for class experiments in recombination, per the enclosed sheet.

You asked for other suggestions. I would strongly recommend that you try replica plating (e.g. for the scoring of the recombinants in the crossing experiment) and indirect selection of a phage-resistant mutant (e.g. B/1) as a proof of pre-adaptive mutation.

Are you going to include a variance analysis ( after Luria and Delbrück?) If so, may I suggest you perfect the experiment and answer Hinshelwood's objections by assaying samples in the first series, and showing a correlation in a second series using a high and low tube as inocula in numbers that should, and should not, carry over a preexisting mutant. That is, a sort of general test of heritability of the response to the phage.

Best luck to your military career. It may turn out to be a more productive experience thanyou would have any present reason to hope.

Sincerely,

Joshua Lederberg

Analysis of variance in bacterial mutation: heritability.

(Exemplary figures from table 2, Exp. 15, L&D 1943)

Assay samples from each of 10 tubes. If you find extremes such as A) 5 B/1 per .05 ml and B) 165 B/1 per .05 ml, set up a second set of series of tubes with inocula as follows:

A1: .001 per tube

B1 //: .001 per tube

B2 //: .00005 per tube.

Series A1 and B2 should resemble the initial distribution (i.e., no mutants in the inoculum) while most of the tubes in B1 should end up with at least 165/.05 (i.e. a prior mutant in the inoculum, QED. The experiment will be the more dramatic according to the actual spread of numbers, which will depend on the scope of the initial series.

P.S. So far as I know, no one has actually done this.

J.L.